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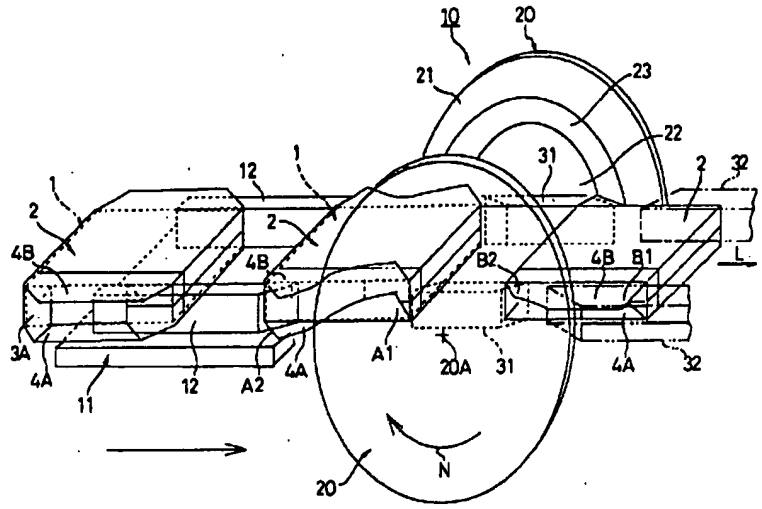
(54) Side folding device for packing machine

(57) In a side folding device 10 for a packing machine, a side folding rotating body 20 having the rotation axis in the direction orthogonal to the input direction of an article 1 to be wrapped is used. And the side folding rotating body 20 comprises folding operation faces 21, 22 for contacting with the side portions 4A, 4B of a film 2 successively from the top edge side to the rear edge side in the direction along the side edge of the article 1 to be wrapped.

FIG. 1



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Description

The present invention relates to a side folding device for a packing machine for the caramel wrapping where the side portions of a wrapping material wound around an article to be wrapped, elongating from the side edges of the articles to be wrapped are folded onto the side faces of the article to be wrapped.

The conventional caramel wrapping comprises the below mentioned process steps (a) to (e) as shown in FIGs. 5(A) to 5(D).

(a) A film 2 as the wrapping material is wound around an article 1 to be wrapped.
(b) Side portions 3A on the front and rear sides of the film 2 elongating from the front and rear side edges of the shorter sides of the end faces of the article 1 to be wrapped are folded (first side fold). After sealing an overlapped portion of the wound film 2, side portions 3B are folded (second side fold)(see FIG. 5(A)).
(c) Lower side portions 4A of the film 2 elongating from the lower side edges of the longer sides of the end faces of the article 1 to be wrapped are folded (downward fold) (see FIG. 5(B)).
(d) Upper side portions 4B of the film 2 elongating from the upper side edges of the longer sides of the end faces of the article 1 to be wrapped are folded (upward fold) (see FIG. 5(C)).
(e) The overlapped portions of the lower side portions 4A and the upper side portions 4B of the film 2 are sealed (FIG. 5(D)).

A side folding device for the above mentioned process steps (c), (d) comprises a side folding guide 5 shown in FIG. 6 arranged in the side folding operation area. The side folding guide 5 comprises an inclined slit 5A for downward folding operation and an inclined slit 5B for upward folding operation. The lower side portions 4A of the article 1 to be wrapped entering the side folding operation area are folded while passing through the inclined slit 5A of the side folding guide 5, and the upper side portions 4B of the article 1 to be wrapped are folded while passing through the inclined slit 5B of the side folding guide 5.

However, the conventional technology has the below mentioned problems.

(i) Since a dedicated side folding guide 5 is required according to the size of the article 1 to be wrapped (the space between the upper and lower side portions 4A, 4B, etc.), and to the order of folding the upper and the lower side portions 4A, 4B, and the side folding guide 5 needs to be changed when the size of the article or the order of folding change, a decline of the rate of operation and a rise of equipment cost are caused.
(ii) Since the folding operation is conducted by passing the side portions 4A, 4B through the inclined slits 5A, 5B of the side folding guide 5, a frictional force is applied also on the side portions 4A, 4B in the conveyance direction, which is orthogonal to the folding direction, resulting in generation of wrinkles on the side portions 4A, 4B after folding in the backward direction with respect to the conveyance direction.
(iii) In order to prevent the generation of wrinkles as mentioned in item (ii), a special surface treatment for alleviating the frictional force, such as a Teflon coating is needed on the side folding guide 5.
(iv) In order to prevent the generation of wrinkles as mentioned in item (ii), the inclination gradient of the inclined slits 5A, 5B of the side folding guide 5 needs to be moderate, or the feed rate of the article 1 to be wrapped needs to be slow. This causes inconveniences, such as a longer side folding line, or decline of the productivity of the side folding device.

The object of the present invention is to conduct various kinds of side folding by a single side folding device with an improved quality of the side folding and simultaneously to simplify configuration and operation of the side folding device, and to improve the productivity.

To solve this object, the present invention according to claim 1 is a side folding device for a packing machine where a wrapping material is wound around an article to be wrapped and side portions of the wrapping material elongating from side edges of the package to be wrapped are folded onto the side faces of the article to be wrapped, said side folding device comprising a side folding means capable of moving relatively in direction along the side edges of the article to be wrapped in a side folding operation area, having a folding operation face for moving in a direction from an outer side to an inner side of the side face of the article to be wrapped, said direction being orthogonal to the side edge of the article to be wrapped so as to contact with the side portions of the wrapping material successively from a top edge side to a rear edge side in a direction along the side edge of the article to be wrapped for folding the side portions from the top edge side to the rear edge side successively in the direction along the side edge of the article to be wrapped.

Advantageous embodiments of the invention are disclosed by the subclaims.

According to the invention of claim 1, the below mentioned effects (i) to (iv) can be achieved.

(i) The folding operation face of the side folding means contacts with the side portion of the wrapping material from the top edge side to the rear edge side in the direction along the side edge of the article to be wrapped successively so that the side portion is folded from the top edge side to the rear

edge side in the direction along the side edge of the article to be wrapped successively.

(ii) According to the above mentioned item (i), the side folding means can fold the side portion of the wrapping material regardless of the size of the article to be wrapped. Accordingly, by a single side folding device, various kinds of side folding can be conducted. That is, replacement or adjustment of the guide is not required for the production of various kinds so that the equipment operation rate can be improved.

(iii) According to the above mentioned item (i), the folding operation face of the side folding means applies the folding operation force to the side portion of the wrapping material only in the folding direction. Therefore, wrinkles hardly generates in the backward direction with respect to the feeding direction so that the quality of the side folding can be improved.

(iv) According to the above mentioned item (iii), the configuration or operation speed of the side folding device needs not be complicated or lowered for the prevention of wrinkle generation and thus the configuration and the operation of the side folding device can be simplified, and the productivity can be improved. The article to be wrapped can be fed not only continuously at a constant rate but also intermittently as needed.

When the first and second side folding means are provided, the above mentioned effects (i) to (iv) can be achieved in folding the first and second side portions elongating from the first and second side edges of the article to be wrapped.

When the rotating body comprising the first and second folding operation faces is used as the side folding means, the above mentioned effects (i) to (iv) can be achieved in folding the first and second side portions elongating from the first and second side edges of the article to be wrapped with a simple and compact device configuration.

Moreover, by changing the rotation direction of the rotating body, the folding order of the first and second side portions can be changed easily.

When the rotating body comprises the side holding face having a ring like flat face between the first and second folding operation faces, the side portion folded onto the side face of the wrapping material by the first or second folding operation face can be held, and the fixation of the folding (reinforcement of the folded portion) of the side portion can be achieved with a simple and compact device configuration.

The present invention will be understood more fully from the detailed description given hereinbelow and from the accompanying drawings of the embodiments of the invention, which are given by way of example only, and are not intended to limit the present invention.

In the drawings:

FIG. 1 is a schematic diagram showing one embodiment of a side folding device;

FIGS. 2(A), 2(B) are schematic diagrams showing the operation principle of the side folding rotating body;

FIGS. 3(A) to 3(C) are schematic diagrams showing the side folding rotating body;

FIGS. 4(A) to (C) are schematic diagrams showing another embodiment of a side folding rotating body;

FIGS. 5(A) to 5(D) are schematic diagrams showing a caramel wrapping processes; and

FIG. 6 is a schematic diagram showing a conventional side folding device.

As shown in FIG. 1, a side folding device 10 is arranged for a side folding operation on a packing line of a packing machine, for folding a lower side portion 4A (first side portion) and an upper side portion 4B (second side portion) of a film 2 elongating from the upper and lower side edges of a article 1 to be wrapped onto the side face of the article 1 to be wrapped (side folding). The article 1 to be wrapped is an example of the caramel wrapping as shown in FIG. 5 mentioned above, which is sent to the side folding device 10 with the front and rear side portions 3A, 3B of the film 2 folded (side folding) and circumferentially sealed around the article so that the lower side portion 4A and the upper side portion 4B of the film 2 are folded to be sent out to the subsequent side sealing processes.

The side folding device 10 comprises a conveyance table 11 for conveying the article 1 to be wrapped along the packing line of the packing machine. A middle part of the conveyance table 11 is used as a side folding operation area. The side folding device 10 comprises a pair of right and left side folding rotating bodies 20, 20 at both sides of the side folding operation area at the middle part of the conveyance table 11. Flat plate like side folding holding guides 12, 12 for holding the front and rear side portions 3A, 3B of the film 2 in the folded state are provided at the both sides of the input side of the side folding rotating bodies 20 of the conveyance table 11. The right and left side folding rotating bodies 20, 20 folds the right side face and the left side face of the article 1 to be wrapped, respectively. In the case only either of the right and left sides of the article 1 to be wrapped is to be folded, a single side folding rotating body 20 will be sufficient.

As shown in FIG. 2, the conveyance table 11 is for feeding the article to be wrapped in the direction along the side edges of the article 1 to be wrapped (the L direction shown in FIGS. 1 and 2) with respect to the side folding rotating bodies 20, 20 arranged on the both side portions of the side folding operation area.

As shown in FIG. 2, the side folding rotating body 20 has a rotation axis 20A in a direction orthogonal to the feeding direction of the article 1 to be wrapped entering the side folding operation area, and is rotated by a driving power source, such as a motor (not illus-

trated). As shown in FIG. 3, a first folding operation face 21 and a second folding operation face 22 are arranged coaxially. The first folding operation face 21 comprises a conical slant face where the inner periphery side is closer to the article 1 to be wrapped than the outer periphery side for folding the lower side portions 4A (the first side portions) of the film 2. The second folding operation face 22 comprises a reverse conical slant face where the outer periphery side is closer to the article 1 to be wrapped than the inner periphery side for folding the upper side portions 4B (the second side portions) of the film 2.

Accordingly, by the rotation of the side folding rotating body 20 in the N direction of FIGS. 1, 2, the first folding operation face 21 of the rotating body 20 moves in direction from the lower outside to the inner side (the A direction shown in FIG. 2) of the side face of the article 1 to be wrapped orthogonal to the side edge of the article 1 to be wrapped at the input side of the feeding direction with respect to the rotation axis 20A of the rotating body 20 so as to contact with the lower side portion 4A from the top edge side (A1 of FIGS. 1, 2) to the rear edge side (A2 of FIGS. 1, 2) in the direction along the side edge of the article 1 to be wrapped successively for folding the lower side portion 4A from the top edge side to the rear edge side in the direction along the side edge of the article 1 to be wrapped onto the side face. The second folding operation face 22 of the rotating body 20 moves to the direction from the upper outside to the inner side (the B direction shown in FIG. 2) of the side face of the article 1 to be wrapped orthogonal to the side edge of the article 1 to be wrapped at the output side of the feeding direction with respect to the rotation axis 20A of the rotating body 20 so as to contact with the upper side portion 4B from the top edge side (B1 of FIGS. 1, 2) to the rear edge side (B2 of FIGS. 1, 2) in the direction along the side edge of the article 1 to be wrapped successively for folding the upper side portion 4B from the top edge side to the rear edge side in the direction along the side edge of the article 1 to be wrapped onto the folded lower side portion 4A.

The side folding rotating body 20 has a side holding face 23 with a ring like flat face for holding the folded lower side portion 4A on the side face of the article 1 to be wrapped by the first folding operation face 21 between the first folding operation face 21 and the second folding operation face 22.

Further, a plate like first side folding holding guide 31 is provided at the both sides of the side folding operation area in the middle part of the conveyance table 11 corresponding to the center part of the rotating body 20 for holding the lower side portion 4A passed through the side holding face 23 of the rotating body 20.

A plate like second side folding guide 32 is provided at both sides of the side folding rotation body 20 on the conveyance table 11 for holding the upper side portion 4B folded on the side face of the article 1 to be wrapped by the second folding operation face 22 of the rotating body 20.

Hereinafter the side folding operation procedure of the side folding device 10 will be explained.

(1) The article 1 to be wrapped with the front and rear side portions 3A, 3B of the film 2 folded with the circumference seal is fed into the side folding operation area by the conveyance table 11. The side folding rotating body 20, rotating in the N direction of FIG. 2, awaits the article 1 to be wrapped.

(2) After the top edge portion (A1 of FIG. 2) in the direction along the side edge of the article 1 to be wrapped reaches the first folding operation face 21 at the input side of the feeding direction with respect to the rotation axis 20A of the rotating body 20, the first folding operation face 21 contacts with the lower side portion 4A of the film 2 from the top edge side (A1) to the rear edge side (A2) in the direction along the side edge of the article 1 to be wrapped successively so as to fold the lower side portion 4A from the top edge side to the rear edge side in the direction along the side edge of the article 1 to be wrapped onto the side face of the article 1 to be wrapped.

(3) After having the lower side portion 4A held by the side holding face 23 of the rotating body 20 for reinforcing the folded portion, the article 1 to be wrapped with the lower side portion 4A of the film 2 folded by the first folding operation face 21 of the side folding rotating body 20 is fed continuously while having the lower side portion 4A held by the first side folding holding guide 31.

(4) After the top edge portion (B1 of FIG. 2) in the direction along the side edge of the article 1 to be wrapped reaches the second folding operation face 22 at the output side of the feeding direction with respect to the rotation axis 20A of the rotating body 20, the second folding operation face 22 contacts with the upper side portion 4B of the film 2 from the top edge side (B1) to the rear edge side (B2) in the direction along the side edge of the article 1 to be wrapped successively so as to fold the upper side portion 4B from the top edge side to the rear edge side in the direction along the side edge of the article 1 to be wrapped onto the side face of the article 1 to be wrapped.

(5) The article 1 to be wrapped with the upper side portion 4B of the film 2 folded by the second folding operation face 22 of the side folding rotating body 20 is fed to the subsequent processes with the upper side portion 4B and the lower side portion 4A held by the second side folding holding guide 32.

In the side folding device 10, by reversing the rotation direction of the side folding rotating body 20 from the N direction of FIG. 2, the folding direction can be changed, that is, the upper side portion 4B of the film 2 is folded by the first folding operation face 21, then the

lower side portion 4A of the film 2 is folded by the second folding operation face 22.

According to this embodiment, the below mentioned effects can be achieved.

(i) By the contact of the folding operation faces 21, 22 of the side folding rotating body 20 with the side portions 4A, 4B of the film 2 from the top edge side to the rear edge side in the direction along the side edge of the article 1 to be wrapped successively, the top edge side to the rear edge side of the side portions 4A, 4B can be successively folded in the direction along the side edge of the article 1 to be wrapped.

(ii) According the above mentioned item (i), the side folding rotating body 20 can fold the side portions 4A, 4B of the film 2 regardless of the size of the article 1 to be wrapped. Therefore, various kinds of side folding can be conducted by a single side folding device 10. That is, since the replacement or adjustment of the guide is not needed for the production of various kinds, the equipment operation rate can be improved.

(iii) According to the above mentioned item (i), the folding operation faces 21, 22 of the side folding rotating body 20 apply the operation force to the side portions 4A, 4B of the film 2 only in the folding direction. Therefore, generation of wrinkles in the backward direction with respect to the feeding direction on the side portions 4A, 4B of the film 2 hardly generate so that the quality of the side folding can be improved.

(iv) According to the above mentioned item (iii), the configuration or the operation speed of the side folding device 10 needs not be complicated or lowered for preventing the generation of wrinkles, and thus the configuration and operation of the side folding device 10 can be simplified and the productivity can be improved. The article 1 to be wrapped can be fed not only continuously at a constant rate but also intermittently as needed.

(v) Since the first and second folding operation faces 21, 22 are provided in the side folding rotating body 20, the effects of the above mentioned items (i) to (iv) can be achieved in folding the first and second side portions 4A, 4B elongating from the first and second side edges of the article 1 to be wrapped with a simple and compact device configuration.

(vi) By changing the rotation direction of the side folding rotating body 20, the folding order of the first and second side portions 4A, 4B can be changed easily.

(vii) Since the side holding face 23 having a ring like flat face is provided in the side folding rotating body 20 between the first and second folding operation faces 21, 22, the lower side portion 4A folded onto the side face of the article 1 to be wrapped by the first folding operation face 21 can be held so that the fixation of folding (reinforcement of the folded portion) of the lower side part 4A can be achieved with a simple and compact device configuration.

Although an embodiment of the present invention has been described in detail with reference to drawings, concrete configurations of the present invention are not limited thereto but modification of the designs without departing from the spirit of the present invention can be made. For example, the below mentioned modifications (A) to (E) can be adopted.

(A) The side folding rotating body 20 comprises the first and second folding operation faces 21, 22 without the guide holding face 23 between the first folding operation face 21 and the second folding operation face 22 as shown in FIG. 4.

(B) The side folding means comprising only one folding operation face in the case the wrapping material has either one side portion elongating from one of the upper and lower side edges of the side face of the article to be wrapped. For example, when only the upper side portion elongating from the upper side edge exists, only the folding operation face for the upper side portion is provided.

(C) The side folding means having first and second side folding means, comprising first side folding rotating body having the first conical slant face folding operation face and the second side folding rotating body having the second reverse conical slant face folding operation face, respectively, are arranged parallel in the feeding direction of the article to be wrapped.

(D) The side folding means having first and second side folding means, comprising first and second side folding rotating bodies (cylindrical bodies) having first and second cylindrical folding operation faces with the rotation axis obliquely are arranged with respect to the feeding direction of the article to be wrapped, arranged parallel in the feeding direction of the article to be wrapped.

(E) The side folding means having first and second side folding belts comprising first and second folding operation belt faces with the belt faces arranged obliquely with respect to the feeding direction of the article to be wrapped, are arranged parallel in the feeding direction of the article to be wrapped.

In implementing the present invention, the side folding means can be moved in the direction along the side edge of the article to be wrapped with respect to the article to be wrapped set in the side folding operation area.

As heretofore mentioned, according to the present invention, various kinds of side folding can be conducted by a single side folding device, the quality of the side folding can be improved, the configuration and the

operation of the side folding device can be simplified, and the productivity can be improved.

Claims

1. A side folding device for a packing machine where a wrapping material is wound around a article to be wrapped and side portions of the wrapping material elongating from side edges of the article to be wrapped are folded onto the side faces of the package to be wrapped, wherein

   a side folding means capable of moving relatively in direction along the side edges of the article to be wrapped in a side folding operation area is provided,
   said side folding means comprises a folding operation face for moving in a direction from an outer side to an inner side of the side face of the article to be wrapped, said direction being orthogonal to the side edge of the article to be wrapped so as to contact with the side portions of the wrapping material successively from a top edge side to a rear edge side in a direction along the side edge of the article to be wrapped for folding the side portions from the top edge side to the rear edge side successively in the direction along the side edge of the article to be wrapped.

2. The side folding device for a packing machine according to claim 1, wherein the wrapping material having first and second side portions elongating from first and second side edges of the side face of the article to be wrapped and

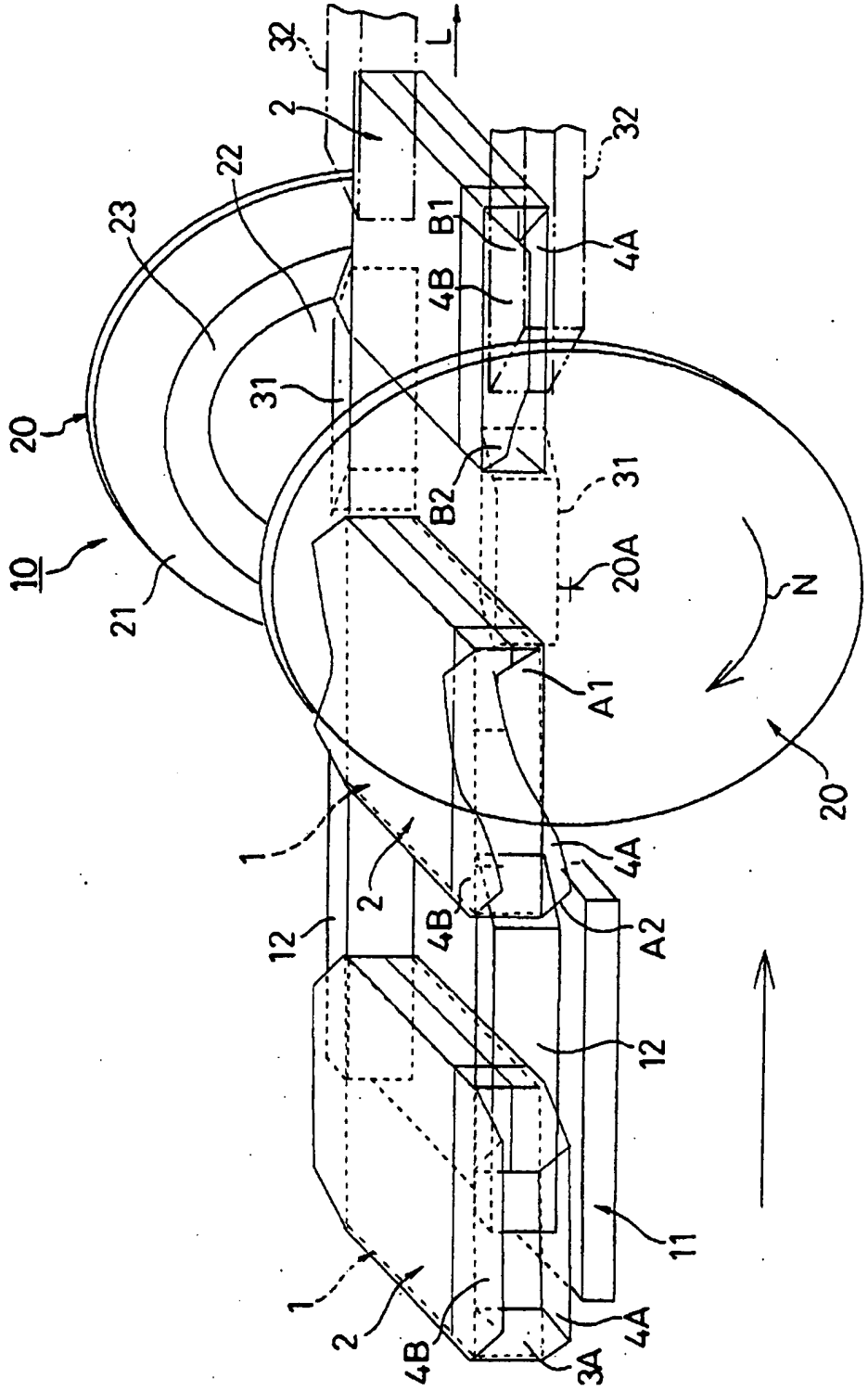
   further comprising a first side folding means for contacting with a first side portion of the wrapping material to fold the first side portion and a second side folding means for contacting with a second side portion of the wrapping material to fold the second side portion for the wrapping material.

3. The side folding device for a packing machine according to claim 1, wherein the wrapping material having first and second side portions elongating from first and second side edges of the side face of the article to be wrapped and

   the side folding means comprises a rotatable side folding rotating body, which has the rotation axis in the direction orthogonal to the relative movement direction of the article to be wrapped entering into the side folding operation area,
   the side folding rotating body comprises a first folding operation face for folding the first side portion, having a conical slant face where the inner periphery side is closer to the article to be wrapped than the outer periphery side, and a second folding operation face for folding the second side portion, having a reverse conical slant face where the outer periphery side is closer to the article to be wrapped than the inner periphery side, coaxially.

4. The side folding device for a packing machine according to claim 3, wherein the rotating body further comprises a ring-shaped side holding face between the first folding operation face and the second folding operation face, for holding a side portion folded onto the side face of the article to be wrapped by the first or second folding operation face.

FIG. 1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4B
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31
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B2
31
10
20A
N
21
A1
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4B
A2
12
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11
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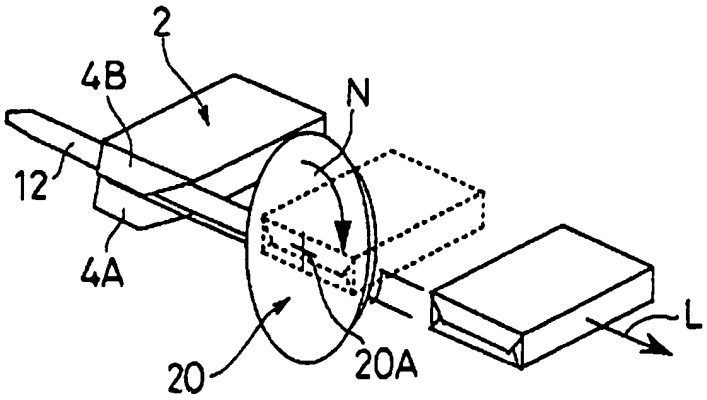
4B
4A
3A

FIG. 2

(A)


2
4B
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12
4A
L
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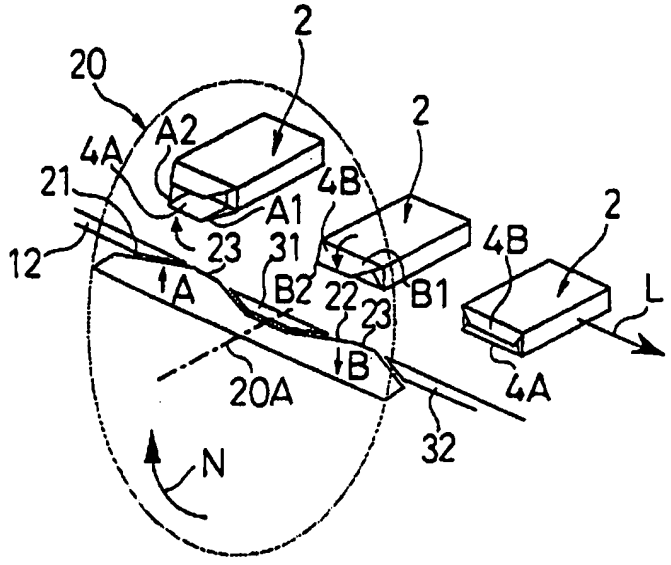
20A

(B)


2
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4A
4B
21
A1
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4A
32
N

FIG. 3

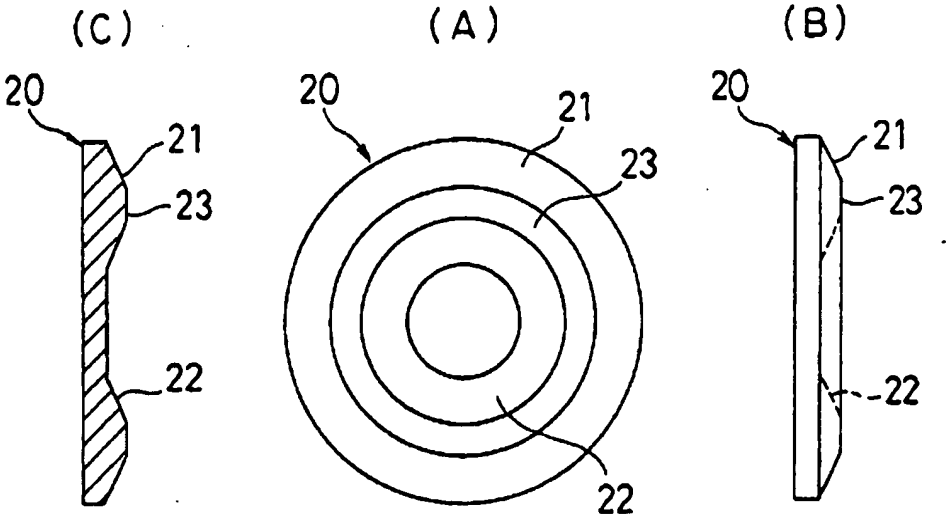


FIG. 4

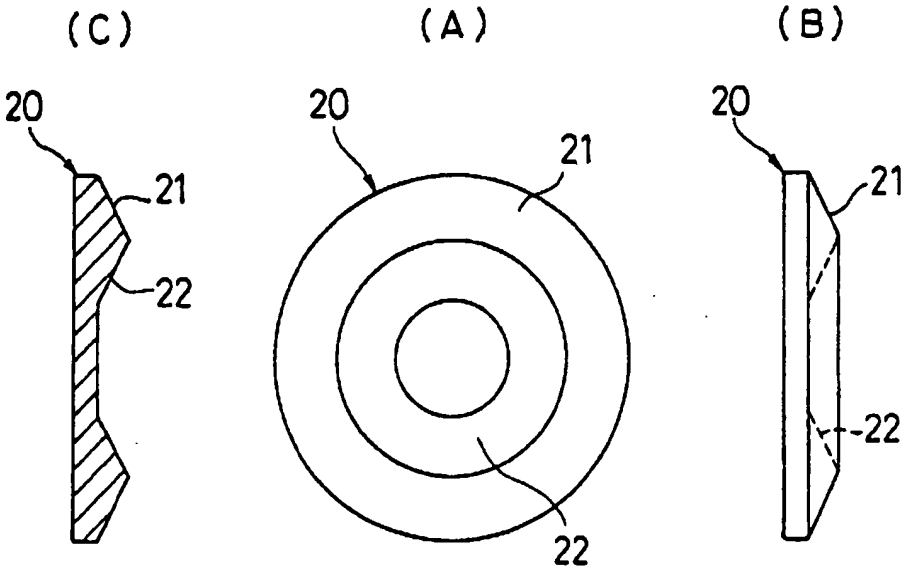
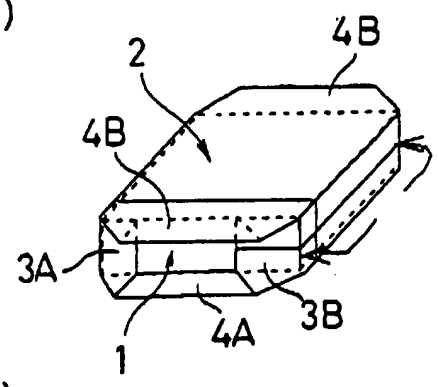
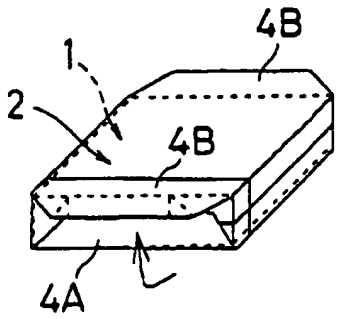


FIG. 5

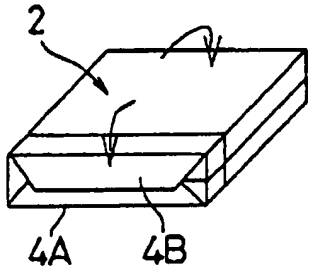
(A)



(B)



(C)



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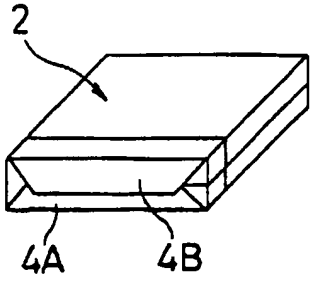
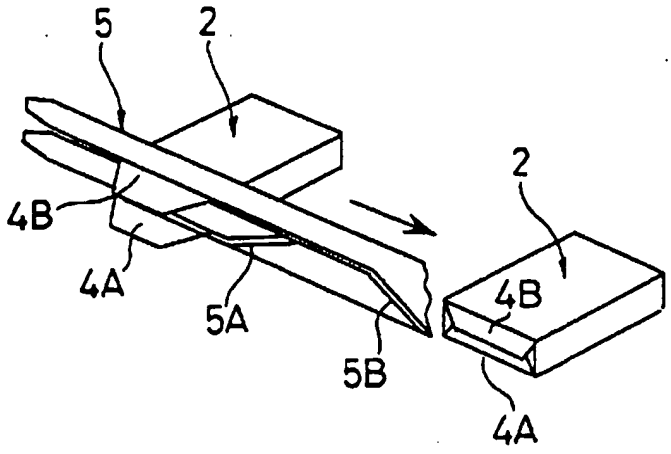


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 97 11 7053

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 1 787 116 A (F. MARASSO) 30 December 1930 * page 2, line 8-30; figures 3,5-7 *	1,2	B65B49/12
A		3	
X	US 1 851 295 A (F.R. SCHMITT) 29 March 1932 * page 4, line 109 - page 5, line 26; figures 20,21 *	1,2	
X	GB 279 276 A (J. WASS) 27 October 1927 * page 3, line 110-120; figure 6.7 *	1,2	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 January 1998	Grentzius, W

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